Basis for State 401 Certification Decision

Rosemont Copper Project

ACOE Application No. SPL-2008-00816-MB

Proposed Action under Review

The application for the Clean Water Act (CWA) Section 404 permit, as submitted, involves discharge of fill material into Barrel Canyon and associated tributaries including Wasp Canyon, McCleary Canyon, Trail Canyon and other unnamed ephemeral washes, for the construction of the proposed Rosemont Copper project. Most of these impacts will result from the development of the pit, associated waste rock storage areas and ancillary mining facilities. Note: changes have been made to the project design during the development of the Final Environmental Impact Statement that modifies certain activities proposed in the CWA §404 application and the Army Corps of Engineers (COE) Public Notice No. SPL-2008-00816-MB issued in December, 2011. One such change is that McCleary Canyon will no longer receive fill to construct the project but will receive stormwater diverted around the site as well as runoff from project facilities.

State 401 Water Quality Certification

Section 401 of the CWA authorizes States to review applications for federal permits or licenses that would allow any discharge to waters of the U.S., including wetlands. The State can approve, conditionally approve, deny or waive certification of the federal permit or license. The State makes its certification decision by reviewing the proposed activities to determine whether the activities, as proposed, or with conditions, will result in State surface water quality standards being met. In addition, States may look at whether the activity will violate effluent limitations, new source performance standards, toxic pollutants, and other water quality requirements of State law or regulation. The federal permit or license cannot be granted by the federal agency until a certification is received from the State. If the State denies the §401 certification, the federal agency cannot issue the permit or license.

Scope

The Arizona Department of Environmental Quality (ADEQ) is the state agency designated for all purposes of the CWA including §401. However, Arizona Revised Statutes (A.R.S.) §49-202(C) limits the department's review under §401 to determine whether the effect of the discharge will comply with the surface water quality standards. In addition, the department's review can extend only to activities conducted within the ordinary high water mark of navigable waters. A.R.S. §49-202(D) also limits the department's ability to place conditions on the certification to those required to ensure compliance with A.R.S. §49-202(C).

ADEQ's review of this application is limited to the actual fill activities proposed in the CWA §404 application, that are being conducted within the ordinary high water mark, and impacts to downstream waters as a direct result of the fill activities.

Background

In response to the Draft Environmental Impact Statement for the Rosemont Copper Project, released for public comment on October 21, 2011, ADEQ provided comments to the Forest Service[2] regarding the scarcity of hydrogeologic data on which the modeling was based; the uncertainty regarding the origin of the springs water; and the predicted reduction in sediment yield, peak stormwater flows and overall runoff volume from the watershed. ADEQ recommended that: (1) additional monitoring of flow, water quality and physical integrity be conducted in Davidson Canyon Wash and Cienega Creek before, during and after mine operations; (2) the EIS should discuss how the potential reductions in flow, and thus assimilative capacity will be monitored and mitigated such that there will be no degradation to either OAW; and (3) the Forest Service consider requiring replenishment water of comparable quality and quantity to offset the predicted water loss resulting from the mining operations and post closure.

In order to issue a State 401 water quality certification, ADEQ must be satisfied that any modifications to hydrology, sediment transport or water quality, as a result of the proposed activities under the §404 permit, will not result in adverse water quality impacts to the downstream OAWs. As part of its certification process, ADEQ may impose additional controls, conditions or mitigation measures, on indirect discharges that occur upstream of or to tributaries of an OAW to maintain and protect existing water quality in a downstream OAW. Mitigation measures, required by the Forest Service under the Final Record of Decision (ROD)[6] and Final Environmental Impact Statement (FEIS)[1], were also evaluated. A listing of the mitigation measures evaluated in support of this Certification decision are listed in Attachment A.

Outstanding Arizona Waters (OAWs) & Antidegradation

Cienega Creek was one of the original OAWs designated by ADEQ in 1992. Davidson Canyon Wash is a spring-fed stream that flows into Cienega Creek near Marsh Station Road. The lower portion of Davidson Canyon Wash was designated as an OAW by ADEQ in January, 2009. The OAW reaches of Davidson Canyon Wash begin approximately 14 river miles downstream of the fill activities.
Barrel Canyon and the associated tributaries are unlisted, ephemeral tributaries that carry the Aquatic and Wildlife - (ephemeral) and Partial Body Contact designated uses (A.A.C. R18-11-105(1)). As ephemeral waters, Barrel Canyon and the associated tributaries are considered Tier 1 waters under Arizona's antidegradation criteria (A.A.C. R18-11-107.01(A)). Under Tier 1, regulated discharges shall not cause a violation of surface water quality standards.

The OAW stretch of Cienega Creek carries Aquatic and Wildlife – (warm water); Full Body Contact; Fish Consumption; and Agricultural Livestock Watering designated uses. The OAW portion of Davidson Canyon Wash is approximately three miles in length beginning at its confluence with an unnamed tributary at 31° 59' 00.0"/110° 38' 46" and then flowing northward to its confluence with Cienega Creek at 32° 01' 05"/110° 38' 32". The Davidson Canyon OAW is divided into three segments. The first and third segments are spring fed and carry designated uses of Aquatic & Wildlife – (warm water); Full Body Contact, Fish Consumption and Agricultural Livestock Watering. The middle segment carries designated uses of Aquatic and Wildlife – (ephemeral); Partial Body Contact, and Agricultural Livestock Watering (See Figure 1).

As OAWs, Tier 3 antidegradation rules (A.A.C. R18-11-107(C)) applies, which states, that "existing water quality shall be maintained and protected in a surface water that is classified as an OAW under R18-11-112. Degradation of an OAW is prohibited." Antidegradation criteria requires the department to conduct the antidegradation review of an individual 404 permit, as part of the 401 water quality certification process, if the discharge may degrade existing water quality in an OAW (A.A.C. R18-11-107.01(D)).

There are no direct discharges to either OAW as part of this proposed §404 application. However, Arizona's *Draft Antidegradation Implementation Procedures (April, 2008)*[3] states that new or expanded discharges, upstream of an OAW, are prohibited where the proposed discharge would degrade existing water quality of the downstream OAW. To assess whether the proposed discharge will result in the lowering of water quality in the downstream OAW, the following factors should be considered:

- Change in ambient concentrations predicted at the appropriate critical flow conditions and the nature, persistence and potential effects of the parameter.
- Changes in loadings and the nature, persistence and potential effects of the parameter.
- Reduction in available assimilative capacity.
- Degree of confidence in the various components of any modeling technique utilized.
- Potential for cumulative effects.

Certification Decision

After consideration of the factors discussed below, ADEQ finds that if the applicant adheres to the conditions of the CWA §404 permit, the conditions and mitigations required in this State 401 Certification, the mitigation measures in the FEIS[1] and requirements of the 2010 Mining MSGP, the Rosemont Copper Project should not cause or contribute to exceedances of surface water quality standards nor cause water quality degradation in the downstream receiving waters including Davidson Canyon Wash and Cienega Creek.

FACTORS CONSIDERED IN ADEQ's CERTIFICATION DECISION

Factor: Change in ambient concentrations predicted at the appropriate critical flow conditions and the nature, persistence and potential effects of the parameter

Conclusion: Existing ambient water quality in the OAWs is high quality and generally meets surface water quality standards. Ambient stormwater quality, representing background conditions pre-mining, exceeds surface water quality standards for several parameters including copper, lead, and silver. Under current conditions, these exceedances do not appear to be impacting water quality in the downstream OAWs. Based on facility design, the use of proper stormwater control measures and the results of laboratory testing, ADEQ finds little potential for exceedances of surface water quality standards in runoff to receiving waters (e.g., Barrel Canyon) as a result of the proposed activities and therefore, no impact on the downstream OAWs. The Forest Service is requiring monitoring of surface water and groundwater to determine impacts and installation of lysimeters in the water rock and tailings piles to monitor for possible seepage from facilities. The 2010 AZPDES Mining Multi-Sector General Permit requires stormwater monitoring and, should actual monitoring data show potential degradation, the 2010 Mining MSGP will require corrective actions to address the issues.

Ambient Surface Water Quality

There is an overall limited amount of water quality data to perform an antidegradation review on a pollutant by pollutant basis on the OAW streams. Rosemont, ADEQ and Pima County have collected limited background baseflow data for Davidson Canyon Wash, near its confluence with Cienega Creek, as well as in Cienega Creek. A review of the background surface water quality data in both Davidson Canyon Wash and Cienega Creek, finds that surface water standards were met at all times for all parameters with one exception. A pH sample taken in June 2008 in Cienega Creek was slightly below the surface water quality standard. The sample result was 6.23 SU; the water quality standard requires not less than 6.5 SU (FEIS page 454)[1]. This standard applies to the Aquatic and Wildlife, warm water; Full Body Contact and Agricultural Livestock Watering designated uses.

Ambient Stormwater Quality in Barrel Canyon and associated tributaries

In anticipation of mining, Rosemont has been collecting stormwater data on Barrel Canyon and its tributaries between July 2008 and September 2011 resulting in samples from 8 different locations on 16 different dates (See Figure 2). The surface water quality standards for the designated uses of Barrel Canyon and the other ephemeral tributaries were exceeded in the background stormwater samples for the following parameters at the following locations:

Summary of Baseline Stormwater Data (2008-2011)

Location(s)	Parameter Exceeded (# of times)
PSW-1 aka Upper Barrel Canyon	Pb (5)
PSW-2 aka Wasp Canyon	Cu (4) Pb (4) Se(1) Tl (1)
PSW-3 aka Factory 125, Junction, Rosemont Junction	Cu (5) Pb (8)

PSW-4 aka McCleary Canyon	Cu (1) Pb (4) Ag (1)
PSW-5 aka RP2, Compliance Check Point	As (3) Cu (7*) Pb (7) Ag(1)
PSW-6 aka Barrel Canyon @ Hwy 83	Pb (3)

*All exceedances are for total metals except one sample for dissolved copper at PSW-5

An analysis of the existing stormwater samples, that are evaluating existing baseline conditions, shows applicable surface quality standards are being exceeded at times in Barrel Canyon and the associated tributaries, prior to commencement of mining operations. While Rosemont is not responsible for exceedances in ambient, natural stormwater, any stormwater discharges from the facility, covered by the 2010 Mining MSGP (discussed below), must not cause or contribute to degradation of water quality in the receiving waters.

The Forest Service has included mitigation measure: **FS-BR-22** which requires Rosemont to monitor surface water, alluvial and deep groundwater at sites in Barrel and Davidson Canyons to determine if there are impacts from pit dewatering on downstream surface waters. ADEQ reviewed and commented on the conceptual monitoring plans for both surface water[4] and groundwater[5]. Ten different monitoring locations are planned and monitoring equipment has been installed at several locations. The other locations will be established once Rosemont finalizes access agreements.

The monitoring data must be provided to the Forest Service on a quarterly basis (ROD Stipulation #15)[6] and Rosemont must report any non-compliant samples to the Forest Service within 72 hours of results. Additionally, Rosemont must provide an annual report to the Coronado (ROD Stipulation #16) [6] of all mining, reclamation and monitoring activities conducted during the previous year and a summary of applicable information including a complete data summary, any data trends, a status plan and plans for the coming year. Rosemont has agreed in a letter dated February 25, 2014[7], to provide copies of the quarterly monitoring reports and annual report directly to ADEQ when they submit them to the Forest Service.

Potential for Seepage from Waste Rock Facility and Tailings Piles to WUS

While seepage is not expected to occur from the waste rock facility or tailings, seepage modeling was conducted in the laboratory and consisted of samples being leached through simulated material. While Table 105 in the FEIS shows potential exceedances of several parameters in the predicted tailings seepage water, the hardness values associated with those sample results are significantly lower than is regularly observed in similar mining operations and in ambient stormwater samples collected by Rosemont in Barrel Canyon (FEIS pages 475-477)[1]. In the event that seepage would daylight in downstream surface waters, it is unlikely that it would exceed surface water quality standards for Barrel Canyon.

The placement of waste rock will be contained by perimeter buttresses, including the perimeter of the dry-stack tailings storage areas to provide structural and erosional stability of the tailings pile (COE Public Notice page 3). Tailings will be stored using a dry stack technique minimizing airborne releases

and water seepage. Building the buttresses and encapsulating the dry stack tailings in waste rock is expected to be beneficial for two reasons: prevention of infiltration of precipitation through the tailings and provision of large volumes of acid-neutralizing waste rock. The method for stacking and placing both waste rock and tailings was reviewed under the Aquifer Protection Permit issued by ADEQ in April, 2012.

To address the possibility of seepage from the waste rock facility, the Forest Service has included mitigation measure **FS-GW-01,** which requires placement of lysimeters or other collection equipment within the waste rock facility in order to monitor for the presence of seepage and allow for analysis of any leachate prior to reaching the aquifer or surface waters. Should the seepage reach surface waters, an individual AZPDES permit would be required and discharges would have to meet the appropriate surface water quality standards including antidegradation.

Stormwater Runoff from the Project

For purposes of stormwater management, the open pit and plant site are closed systems with direct rainfall contained on site in the lined process water/temporary storage pond or the lined settling basin. Other stormwater design features include two diversion channels. The pit diversion channel will divert unimpacted stormwater around the west and south sides of the open pit (COE Public Notice Figs 3, 6, 7). Water in the channel will be directed to the perimeter containment area located along the west side of the waste rock storage area. The pit diversion channel is designed to convey the local and general probable maximum precipitation (PMP) event. The permanent diversion channel No. 1 will be constructed on the northeast side of the pit and divert unimpacted stormwater from an upgradient watershed into McCleary Canyon. This channel is also designed to convey the local and general PMP.

During operations and post-closure, both the waste rock facility and tailings piles will be exposed to surface runoff that can reach downstream surface waters. To control runoff from these facilities, Rosemont will employ sediment control structures to temporarily capture stormwater for the purpose of slowing velocities, reducing total suspended sediments, and serve as a location for sample collection for monitoring purposes, prior to releasing flows downstream. Downstream of the waste rock facility at the toe of the slope, separate sediment control structures will be placed on both the Barrel Canyon drainage and the Trail Creek drainage.

As part of the APP process, Rosemont conducted Synthetic Precipitation Leaching Procedure (SPLP) testing on a variety of core samples representing the major anticipated waste rock types. SPLP is an EPA testing method to determine the mobility or "leachability" of contaminants in liquids, soils and wastes. According to the FEIS, the predicted water quality for runoff from waste rock does not exceed any applicable surface water quality standards in Barrel Canyon except for dissolved silver. From the SPLP testing, the predicted concentration of dissolved silver in stormwater runoff from the waste rock facility may be 0.0025 mg/l or 2.5 ug/l (Table 105, FEIS page 476[1]).

ADEQ reviewed the same data and finds little likelihood that dissolved silver will exceed SWQS. The applicable SWQS for Barrel Canyon and tributaries are Aquatic and Wildlife – ephemeral, acute, and Partial Body Contact. Many of the surface water quality standards for metals, in the dissolved fraction, are based on water hardness at the time of sampling. As noted earlier, ADEQ has reviewed the stormwater data collected from Barrel Canyon and tributaries. Of the 37 samples collected for dissolved silver, 26 had both a dissolved silver concentration and a hardness value reported. Of these 26 samples, three had laboratory detection limits greater than the applicable SWQS. None of the remaining 23 samples exceeded the applicable SWQS for dissolved silver based on the in-stream hardness at the time of sampling. If the predicted dissolved silver concentration in stormwater runoff from the waste rock facility is 2.5 ug/l and it exceeded surface water quality standards, that would suggest a water hardness of approximately 85 mg/l as $CaCO_3$, which is a very low water hardness for stormwater particularly in a hard rock mining area. Of the 30 samples collected that had hardness values, the average hardness was 611 mg/l, with 60% of those samples having a hardness of 350 mg/l or greater. Contrary to the FEIS discussion on page 472-473, ADEQ does not find it likely that dissolved silver will exceed surface water quality standards in runoff from the waste rock facility. In fact, based on the limited data collected to date, it is unlikely that runoff from the waste rock facility will exceed any surface water quality standard.

Stormwater discharges from mining operations require permitting under § 402 of the Clean Water Act. Under the 2010 Mining MSGP, Rosemont must select, design, install and implement control measures, as appropriate, to ensure discharges meet applicable surface water quality standards. The permit requires development of a Stormwater Pollution Prevention Plan (SWPPP) that demonstrates discharges will not degrade existing water quality in the downstream OAW (2010 Mining MSGP Part 1.1.4.6.(2)(b)). Furthermore, the MSGP requires the permittee to control discharges from the facility so as not to cause or contribute to an exceedance of applicable surface water quality standards (2010 Mining MSGP Part 2.2.2). The permit requires analyses for pH, hardness, antimony, arsenic, beryllium, cadmium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc. If surface water quality exceedances occur, corrective actions would be required to ensure the facility's discharge does not cause or contribute to degradation of existing water quality. Possible corrective actions include further segregation of waste rock, additional control measures and/or treatment.

ADEQ issued Rosemont coverage[8] under the 2010 Mining MSGP in February 2013 contingent on submittal of the Stormwater Pollution Prevention Plan (SWPPP) 60 days prior to anticipation commencement of construction and/or mining operations. ADEQ received the entire SWPPP on January 14, 2014 and is in the process of reviewing it to ensure that stormwater controls are protective of water quality in the downstream receiving waters. Once ADEQ has reviewed the SWPPP, it may require additional sampling and/or stormwater controls or may require coverage under a different AZPDES permit. In addition to the requirements of the MSGP, the Forest Service has included the following mitigation measures: **FS-SW-01, FS-SW-02, FS-GW-03, OA-SW-01**

Factor: Changes in loadings and the nature, persistence and potential effects of the parameter

Conclusion: Additional studies contracted by the Forest Service after the DEIS review concluded that the proposed fill activities will not have a significant impact on the geomorphology of Barrel and Davidson Canyon due to both physical and hydrologic characteristics of the watershed. The Forest Service will also require monitoring of sediment between the mine and SR83 to identify areas of scour or aggradation. ADEQ will receive copies of the monitoring on a quarterly basis and will require corrective action should impacts to geomorphology occur.

Sediment Delivery/Sediment Yield

Potential impacts on surface water quality due to the proposed fill activities could include changes in downstream sediment yield caused by the loss of waters of the U.S. / watershed area and changes in downstream geomorphology due to changes in sediment yield. Ephemeral and intermittent streams provide natural erosion and sediment control. Changes to sediment transport in streams can adversely affect water quality by increasing total suspended sediment in surface water flows and altering the physical integrity of the system, causing problems with scour or aggradation which have the potential to result in water quality degradation.

The Forest Service addressed concerns raised about sediment delivery through independent review. The Patterson and Annandale (2012) study concluded that, based on three variables (sediment availability, channel geometry, and water flow), the proposed fill activities in Barrel Canyon and associated tributaries, will not have a significant impact on the geomorphology of Barrel and Davidson Canyon.

The study found that availability of loose sediment on the surface in Barrel and Davidson Canyon would continue to supply sediment to the streams as there is more sediment available than the stormflow can transport. The estimated impact of the total change in flow and sediment load in lower Davidson Canyon would be within the normal variation of an ephemeral fluvial system. Secondly, the study found the presence of two grade control structures, between Highway 83 and the beginning of the OAW, would prevent stream degradation as they would limit the extent of both upstream and downstream erosion. Lastly, the study states the nature of storm variability and inputs of sediment from various locations throughout the watershed at various times would continue to provide sediment to the downstream waters and it is reasonable to expect little change in the system as a result of the fill – especially in lower Davidson Canyon, located over 14 miles downstream of the activities (FEIS pages 465-466)[1].

The Forest Service mitigation measure **FS-SR-05** requires monitoring of sediment between the mine and SR83 (the Barrel Canyon gage) to identify areas of scour or aggradation that could be caused by changes in sediment load and surface flows. ADEQ will receive copies of the monitoring on a quarterly basis and will require corrective action should impacts to geomorphology occur.

Factor: Reduction in available assimilative capacity

Conclusion: The long term trend of surface flows in both Davidson Canyon and Cienega Creek appears to be one of continual decline. This is likely due to a variety of factors including an increase in the number of domestic groundwater wells in the basin, persistent drought and climate change and not as a result of the mine operations. The springs that feed the OAW stretch of Davidson Canyon are strongly influenced by stormwater runoff from summer precipitation that infiltrates the alluvial aquifer. The FEIS shows the preferred alternative results in a predicted 17.2% reduction in average annual postclosure runoff volume from the watershed. ADEQ is requiring Rosemont to develop and implement a surface water flow mitigation program to replace the predicted reduction in runoff volume.

Reduction in runoff volume

Reductions in stormwater flows due to the fill activities could affect a number of downstream uses including: 1) a potential reduction in recharge to the alluvial aquifer which feed the springs in Davidson Canyon; 2) sustaining riparian vegetation; and 3) use by livestock and wildlife. Loss of flow could translate to a potential loss of assimilative capacity and degradation to water quality and/or riparian areas.

Several reports document that the long-term trend of surface flows – pre-mining, in both Davidson Canyon Wash and Cienega Creek, is in continual decline due to numerous factors including an increase in domestic groundwater wells in the basin, persistent drought and climate change. Pima County has been monitoring stream flow in Davidson Canyon since 2005 and along lower Cienega Creek since 1993.

When nominated as an OAW by the Pima Association of Governments in 2003, Davidson Canyon was identified as a perennial, free-flowing reach[9]. A Pima County study in 2003 estimated Davidson Canyon's relative contribution of base flows to Cienega Creek at Marsh Station Road range from 8-24%[10]. Field visits conducted since 2010 have found that most of the reach has been dry. Based on data from 1968 through 1975, except for some small perennial sections, both Davidson Canyon and Lower Cienega Creek were intermittent streams that flowed for limited portions of the year, with some perennial reaches in Upper Cienega Creek. (FEIS page 412)[1]. Currently, along Cienega Creek, a perennial reach occurs just upstream and downstream of its confluence with Davidson Canyon. Between 1990 and 2011, surface flows in Cienega Creek declined by 83 percent and the extent of flow declined by 88 percent. Davidson Canyon exhibits a similar drying trend.

The period of record for the USGS gage on Davidson Canyon (gage no. 09484590) was February 1968 to September 1975 but is no longer in service. The range of mean monthly flows corresponds to the monsoon season. The data also shows a temporal variability and many months with no flow. While

there were periods of perennial type flow (circa 1968), from 1990-2011, a Pima County's study shows the Davidson Canyon gage recorded flow on 95 separate days[11] in 21 years.

Reach 2 and Escondido Springs are strongly influenced by stormwater runoff from summer precipitation which infiltrates the alluvial aquifer (FEIS page 535)[1]. Recognizing the importance of delivering unimpacted stormwater to the downstream watercourses to help recharge the shallow alluvial aquifers, the Forest Service mitigation measures require that stormwater diversion channels and facility locations be designed and located in order to maintain flow downstream as much as possible and to avoid contact of stormwater with processing facilities and ore stockpiles (**FS-SW-01**). The specific stormwater diversions for the Barrel Alternative are also designed to route more stormwater into downstream drainages post-closure (**FS-SW-02**).

While ADEQ is precluded by statute from requiring monitoring in a State 401 certification, the Forest Service is requiring Rosemont to conduct monitoring to determine if there are impacts from pit dewatering on downstream sites in Barrel and Davidson Canyon (**FS-BR-22**) in accordance with both surface water and groundwater monitoring plans[3,4] prepared by Rosemont and reviewed and commented on by ADEQ. Rosemont[7] has agreed to provide the quarterly monitoring reports and the annual report to ADEQ at the same time they are submitted to the Forest Service. ADEQ will review and track the data to ensure there is no degradation to downstream OAWs. In the event data suggests degradation is occurring, ADEQ may request that the COE suspend the CWA 404 Permit and require additional mitigation (State 401 Certification Condition 5.2.1).

The Forest Service mitigation measure **RC-SW-01** requires Rosemont to fund the U.S. Geological Survey for the continued operation and data gathering at the USGS flow gage on Barrel Canyon at Highway 83 to provide data on surface water flows downstream of the mine site for the life of the mine and for at least five years after closure.

The FEIS shows that the Barrel Alternative results in a predicted 17.2% reduction in average annual postclosure runoff volume from the watershed (Table 90, FEIS page 429)[1], although downstream within the OAW reaches, the impacts from activities would be attenuated as the contributing watershed becomes larger (FEIS page 429)[1]. The Barrel Alternative results in the least reduction of average annual postclosure runoff volume of any of the action alternatives.

However, a 17.2% reduction, if realized, could result in a potential loss of assimilative capacity and therefore, potential degradation of water quality. Similar to the Forest Service mitigation measure, **FS-SSR-01**, where Rosemont must purchase water rights to compensate for impacts in the Cienega Creek watershed to offset predicted reductions in peak stormflows, ADEQ will require Rosemont to develop and implement a surface water flow mitigation program for Lower Davidson Canyon to replace the predicted reduction in average annual postclosure runoff volume – a predicted minimum of 17.2%, as a result of the activities.

This flow mitigation program could include a variety of strategies including the purchasing, retiring, severing and transferring of water rights on Lower Davidson Canyon; delivery of CAP water or other available water resources, drilling wells, etc. The purpose of the condition is to maintain aquatic and riparian resources at pre-project levels in the OAW portion of Davidson Canyon to its confluence with Cienega Creek. Any water rights involved should be proximal to Lower Davidson Canyon to provide the most direct result to the OAWs. Water from any other source may require treatment to ensure it meets surface water quality established for the OAWs.

Of note, Pima County states in its December 30, 2013 letter to the COE, "[S]ignificant lands are still available in the watershed for acquisition and restoration" Andrada Ranch, which abuts the Rosemont and Bar V Ranches, "includes 271 acres of fee-owned land centered on over 4,000 linear feet of Davidson Canyon, just upstream of the OAW reach and also includes water rights to a perennial or near-perennial stock pond and a perennial spring located on fee-owned land that has wetland vegetation and restoration potential".

Factor: Degree of confidence in the various components of any modeling technique utilized

Conclusion: As a result of the DEIS review, several agencies questioned the accuracy of the models in predicting impacts to downstream waters. The Forest Service contracted additional hydrogeologic analysis of Davidson Canyon, using observed field data rather than modeling, to determine whether the source of the springs in the OAWs is the regional aquifer or the shallow alluvial aquifer. The Tetra Tech report supports the fact that springs in lower Davidson Canyon are derived from a localized source, specifically storm flows stored in shallow alluvial stream sediments, and therefore the impacts of drawdown by pit dewatering is unlikely to result in any noticeable loss of flows in Davidson Canyon or Cienega Creek.

Modeling and Field Data Observations

The proposed activities may have an effect on stream flow and by extension, water quality. In the FEIS, the impact of the project on stream flows was predicted primarily through groundwater modeling. For the most part, however, the threshold of accuracy for the available groundwater models (predictions of ± 5 feet) makes the analysis of groundwater drawdown on distant surface water highly uncertain. The analysis of impacts to stream flow reflects predicted impacts from relatively small amounts of groundwater drawdown, sometimes fractions of a foot, that are occurring decades, hundreds, or even 1,000 years in the future (FEIS page 501)[1].

Several agencies raised questions as to the degree to which the models used can accurately predict the severity of impacts to perennial and intermittent streams downstream of the proposed activities. The Forest Service looked at two components. First the impact of predicted drawdown from the mine compared to existing baseline conditions in the OAWs. Secondly, other trends or factors that could increase the severity or probability of impacts occurring including:

- presence of T&E species,

- the long-term trend of declining surface flows in Lower Cienega Creek,
- reported changes in the species compositions of riparian communities from hydro- and mesoriparian communities to more xeric plant communities, and
- climate models predicting a trend of increasing temperatures, decreasing precipitation and increased periods of drought in the arid southwest.

Potential Impacts based on a Shallow Alluvial Source

Tetra Tech performed a detailed hydrogeologic analysis of Davidson Canyon using observed field data rather than modeling (FEIS pages 534-535)[1]. Based on water quality data, geological mapping, observed groundwater levels and observed flow data, Tetra Tech drew several conclusions about the origin of surface flows in lower Davidson Canyon beginning at Reach 2 Spring. The report concludes that it is likely that Reach 2 as well as Escondido Spring derives its water from ephemeral storm flows stored in shallow alluvial stream sediments that are forced to the surface by bedrock constrictions in the stream channel. Further these springs are not likely connected to the regional aquifer that would be impacted by the mine pit dewatering.

These conclusions are based on several lines of evidence. Geological conditions were observed that would be conducive to forcing shallow alluvial water to the surface in the locations of Reach 2 and Escondido Springs. In addition, isotope signatures of water from these two springs reflect the influence of summer precipitation, in contrast to wells in the regional aquifer which reflect the influence of winter precipitation. Lastly, this stretch of Davidson Canyon has actually been dry during the past few years, rather than being supported by perennial flow, as would be expected from a regional groundwater source (FEIS page 535)[1]. Following publication of the DEIS, the Forest Service undertook further investigation of impacts to OAWs and hired SRK Consulting to review and weigh the evidence to determine the most likely source of water for flows in Davidson Canyon. SRK concluded that while there is still some uncertainty, the available information, namely observed groundwater levels in a well located in lower Davidson Canyon, observations of Reach 2 Spring on multiple, sequential field visits, and isotopic signatures of the spring water, suggests no connection between the Davidson Canyon springs and the regional aquifer (FEIS page 535)[1].

ADEQ finds the weight of evidence supports that lower Davidson Canyon is not hydraulically connected to the regional aquifer that would be impacted by the pit dewatering. Rather, the available evidence reinforces that the stream flow and springs arising in lower Davidson Canyon are derived from a localized source, specifically storm flows stored in shallow alluvial stream sediments. Reductions in surface flow due to surface disturbance and the removal of portions of the upstream watershed could potentially reduce recharge to the shallow alluvial aquifer in lower Davidson Canyon, impacting Reach 2 and Escondido Springs, and potential base flow between those springs and Cienega Creek. Assuming the source of flows is alluvial, impacts of drawdown by pit dewatering is unlikely to result in any noticeable loss of flows in Davidson Canyon.

As noted earlier, the predicted reduction in average annual postclosure runoff volume from the affected watershed is 17.2% as a result of capture of runoff by mine facilities. As a condition of the State 401 Certification, Rosemont shall submit to ADEQ, for review and approval, a surface water mitigation program designed to maintain aquatic and riparian resources at pre-project levels in Davidson Canyon and Lower Cienega Creek. The program shall include, but is not limited to, a description of measures that will be taken to offset predicted reductions in surface water flow, in response to the project, along with a proposed schedule for implementation. Once approved by ADEQ, Rosemont shall implement the approved mitigation program, within 30 days, in accordance with the schedule set forth in the approved program. Should the results of required monitoring and/or revised hydrologic modeling (Forest Service Mitigation Measures **FS-BR-22, FS-BR-27, FS-GW-02, FS-SR-05**) indicate that water quality in Davidson Canyon or Lower Cienega Creek is adversely affected by the activities certified herein, ADEQ may request that the COE suspend the CWA 404 Permit and require additional mitigation.

Predicted Effects on Lower Cienega Creek

The potential for reduction in perennial stream flow on Lower Cienega Creek would be driven by two factors: reduction in contribution from Davidson Canyon and reduction in contribution from Upper Cienega Creek. Based on the analysis of Davidson Canyon, the same conclusions would apply to Lower Cienega Creek below the confluence with Davidson Canyon – reduction in surface flows would be minimal.

In consideration of uncertainty associated with predicting long-term impact of any hydrologic systems and the limitations identified in the groundwater models, four monitoring components have been incorporated into the Forest Service mitigation and monitoring plan: **FS-BR-22, FS-SSR-02, FS-BR-27, RC-SW-01**

Factor: Potential for Cumulative Impacts

Conclusion: As discussed above, existing water resources in the OAWs have been observed to be in decline. The causes for this decline may include: climate change, persistent drought and increases in groundwater pumping within the Davidson Canyon / Cienega Creek basin (FEIS page 525)[1]. The springs that feed the OAW stretch of Davidson Canyon are strongly influenced by stormwater runoff from summer precipitation that infiltrates the alluvial aquifer. By requiring Rosemont to develop and implement a surface water flow mitigation program, Rosemont will be replacing those flows that are being captured or truncated higher up in the watershed and providing them more directly to the OAWs.

Domestic Wells, Climate Change and Drought

Wells in the project area are primarily used for domestic and stock water uses and have sustainable yields from of 1-3 gallons per minute on average. Estimates of groundwater use by wells in the Davidson Canyon/Cienega Creek Basin are approximately 400-500 acre-feet per year with most of this

occurring in the Sonoita-Elgin area. Many of these wells may not tap the regional aquifer but rely on smaller, isolated pockets of alluvium or perched units not hydraulically connected to the regional system. This type of water use has steadily increased throughout the basin. In 1980, approximately 630 domestic or stock wells were known in the Cienega Basin. By 1990 that number had increased to more than 1,000 wells and by 2010, ADWR records show more than 1,800 exempt wells (FEIS page 527)[1]. Pima County actually holds a water right just upstream of the preserve, on its Bar V Ranch. The current lessee at Bar V Ranch periodically creates earthen dams in Davidson Canyon Wash to divert surface flows directly into a stock pond. While the impact of an individual well or stream diversion is generally small, the cumulative impact of these types of activities and uses could be substantial. In addition, this area is not within an AMA so there are few restrictions on drilling or pumping. The growth in the area over the past 30 years is likely to continue.

Climate change in the Southwest is predicted to bring higher mean annual temperatures over the next 100 years, along with less winter precipitation, and increase in extreme rainstorms and flooding and longer period of drought. Models consistently suggest rising temperatures, but the effects on precipitation, especially seasonal timing of precipitation, are less consistent. The reaction of riparian vegetation to changing climate conditions will also influence water availability in riparian areas.

Arizona and the entire Southwest are in the midst of a multi-decadal drought that began, according to most experts, in the late 1990s and, with the exception of a few wet years, has yet to be alleviated. Pima County has documented significant long-term changes observed on the Cienega Creek Natural Preserve between 1990 and 2011. Measurements of drought severity indicate that drought conditions have been ongoing in the Cienega Creek basin since 1996 and are reflected in a noticeable reduction in the amount of stream flow, the geographic length of stream flow and the average depth to groundwater. The causes for these changes are likely varied, but persistent drought is one the leading stressors (FEIS page 525)[1].

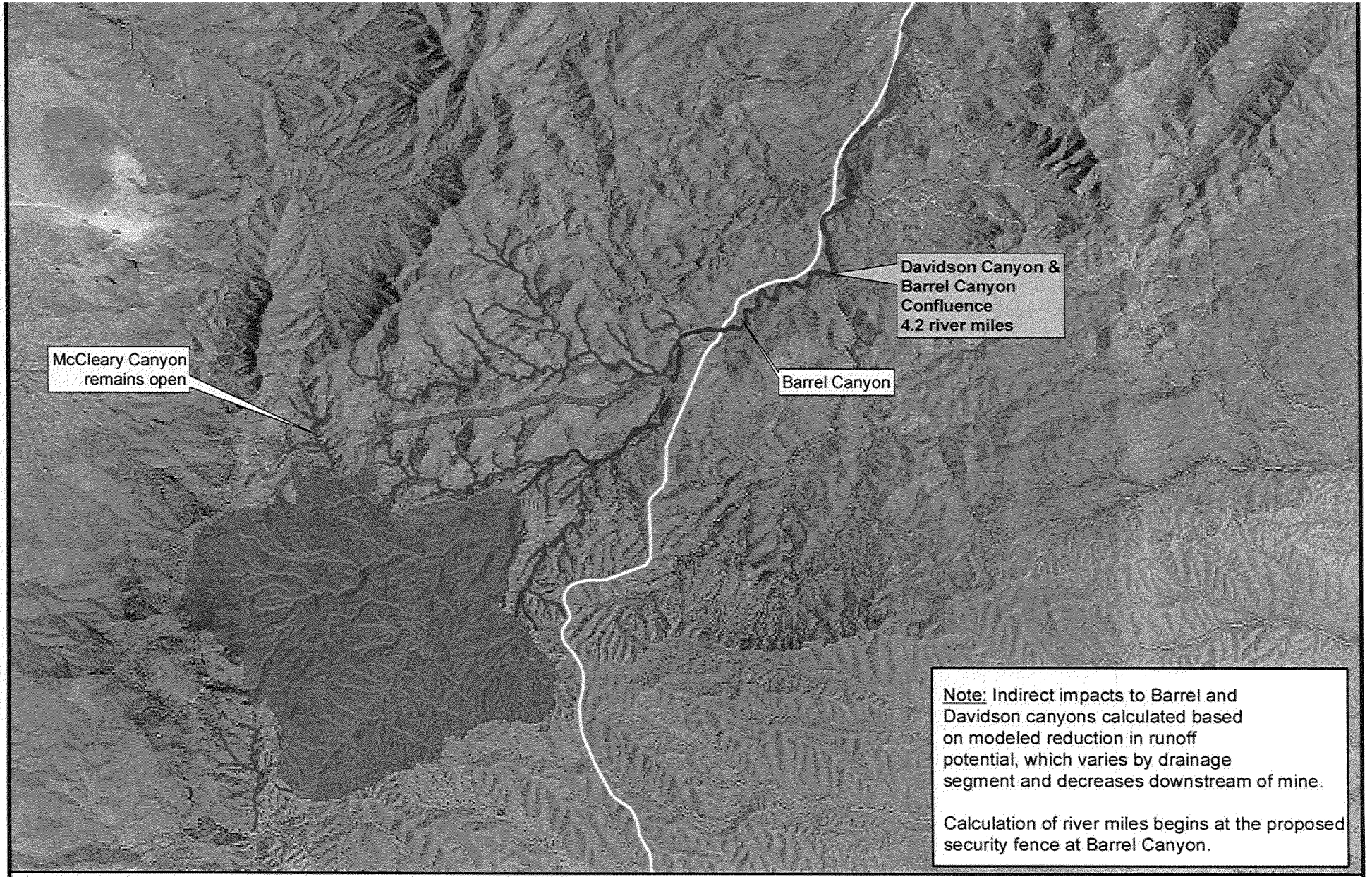
ATTACHMENT A

FEIS Mitigation Measures

FS-SW-01	Location, design and operation of facilities and structures intended to route stormwater around the mine and into downstream drainages
FS-SW-02	Stormwater diversions for Barrel Alternative designed to route more stormwater into downstream drainages post-closure
FS-SSR-02	Seeps, springs and enhanced waters monitoring
FS-BR-22	Monitoring to determine impacts for pit dewatering on downstream sites in Barrel Canyon and Davidson Canyon
FS-BR-27	Periodic validation and rerun of groundwater model throughout life of mine
FS-SR-05	Sediment transport monitoring
OA-GW-02	Segregation and encapsulation of potentially acid-generating waste rock with rock that has buffering capabilities
OA-SW-01	Detention and testing of stormwater: Requires the detention and testing of stormwater quality from perimeter waste rock buttress areas for water quality testing prior to entering surface waters
RC-SW-01	Continued operation and data gathering of the USGS flow gage

REFERENCES

1. USDA Forest Service, *Final Environmental Impact Statement for the Rosemont Copper Project*, December, 2013. Available at: *http://www.rosemonteis.us/*
2. ADEQ, Letter to U.S. Forest Service, *Comments on the Rosemont Copper Project Draft Environmental Impact Statement*, dated January 18, 2012
3. ADEQ, *Draft Antidegradation Implementation Procedures,* April, 2008. Available at: http://www.azdeq.gov/environ/water/standards/download/draft_anti.pdf
4. Water and Earth Technologies, Inc., *Davidson Canyon Conceptual Surface Water Monitoring Plan*, March, 2012
5. Engineering Analytics, Inc., *Davidson Canyon Conceptual Groundwater Monitoring Plan*, March, 2012
6. USDA Forest Service, *Draft Record of Decision and Finding of Nonsignificant Forest Plan Amendment for the Rosemont Copper Project*, December, 2013. Available online at: http://www.rosemonteis.us/
7. Rosemont Copper, Letter to ADEQ, *Water Quality Reports and Data Sharing*, dated February 25, 2014
8. ADEQ, Letter to Rosemont Copper, *Multi-sector General Permit Authorization*, dated February 7, 2013
9. Pima Association of Governments, *Davidson Canyon Unique Water Nomination*, for Pima County Regional Flood Control District, January, 2005. Available at: http://www.rosemonteis.us/documents/pag-watershed-planning-2005
10. Pima Association of Governments, *Contribution of Davidson Canyon to Base Flows in Cienega Creek*", November, 2003. Available at: http://www.pagnet.org/wq/reports/wq_report_94.html
11. Pima County Office of Sustainability and Conservation, *Water Resource Trends in the Cienega Creek Natural Preserve, Pima County, AZ*, August 2013. Available at: http://www.rosemonteis.us/files/references/powell-2013.pdf



T16S, R17E; T17S, R16 & 17E;
T18S, R15 & 16E; T19S, R15 & 16E
Pima County, Arizona,
Photo Source: NAIP 2013
Data Source: ADEQ and ESRI

WestLand Resources, Inc.
Tucson • Phoenix • Flagstaff
4001 E. Paradise Falls Drive
Tucson, Arizona 85712 (520) 206-9585

N

0 3,000 6,000 Feet

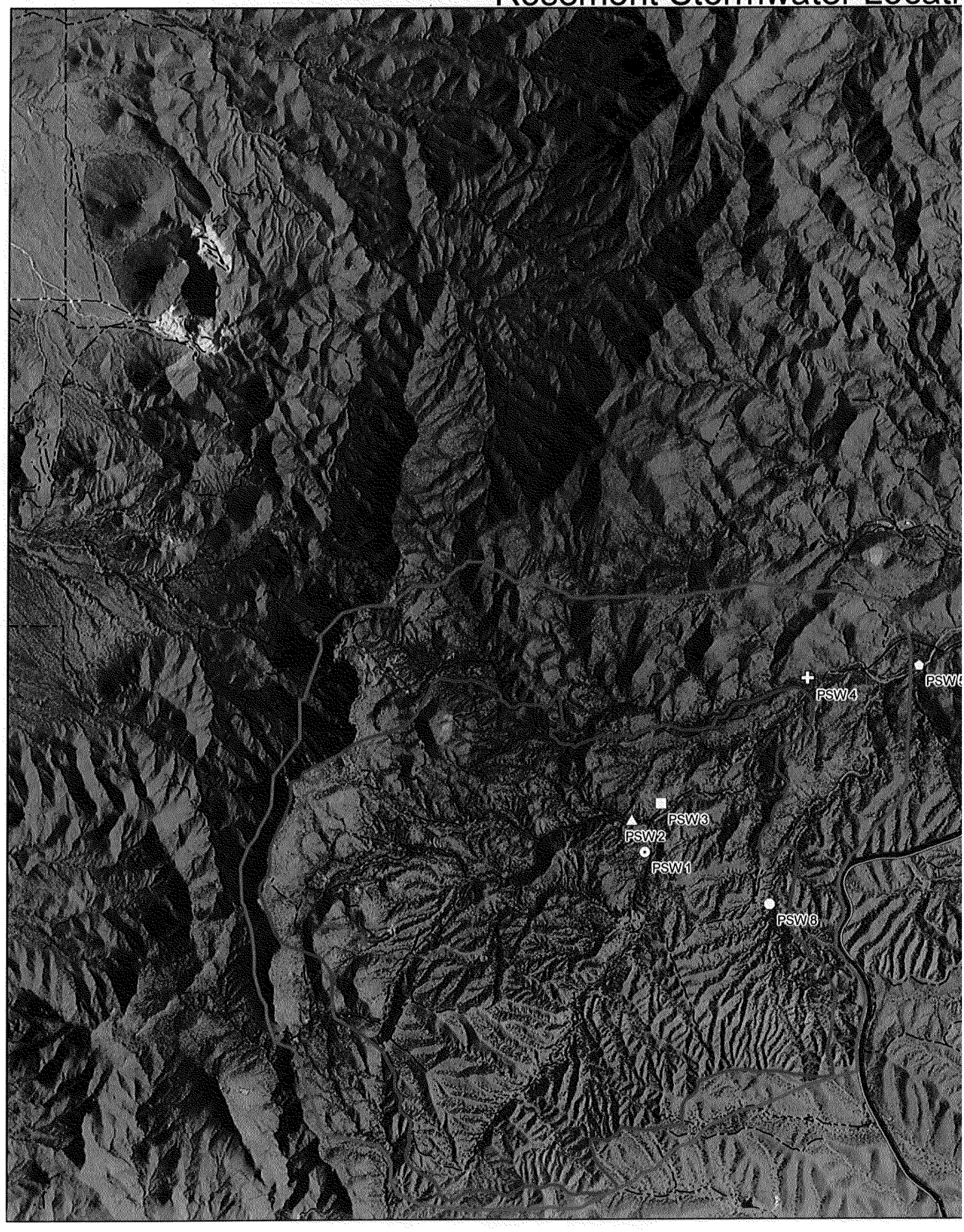
Legend

- Proposed Project Footprint (Security Fence and Access Road)
- Directly Impacted Potential Waters of the U.S.
- Indirectly Impacted Potential Waters of the U.S.
- Indirect Impacts(From SR 83 to Cienega Creek)
- Unimpacted Potential Waters of the U.S.
- Outstanding Arizona Waters (ADEQ)

ROSEMONT PROJECT
Impact To Waters of the United States

Figure 1

Rosemont Stormwater Locati



ROSEMONT COPPER
REDEFINING MINING.
www.rosemontcopper.com

February 25, 2014

Ms. Linda Taunt
Water Quality Division
Arizona Department of Environmental Quality
1110 West Washington
Phoenix, Arizona 85716

Re: Water Quality Reports

Dear Ms. Taunt:

As per our previous discussion and so that there is no confusion regarding the commitment Rosemont has made to the Department to share data, I am transmitting that commitment in writing.

> *Rosemont commits to provide the information as specified in General Conditions 5 and 6 on page 5 of 9 of the Draft 401 Certification that was issued for comment on February 21, 2014.*

Please let me know there are further concerns on if you require additional considerations.

Regards,

Katherine Ann Arnold
Vice-President, Environmental and Regulatory Affairs

cc: Scott Thomas, Fennemore Craig

Doc. No. 012/14-15.5.6.1

PO Box 35130 Tucson, AZ 85740-5130 Office: (520) 495-3500 Fax: (520) 495-3540

Janice K. Brewer
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Henry R. Darwin
Director

February 07, 2013

Ms. Katherine Arnold, P.E.
Vice President of Environmental and Regulatory Affairs
Rosemont Copper Company
P.O. Box 35130
Tucson, Arizona 85705

RE: Multi-Sector General Permit Authorization

Dear Ms. Arnold:

Please find attached a copy of the Rosemont Copper Company's (RCC) authorization certificate for industrial stormwater permit coverage under Arizona's Multi-Sector General Permit for mining activities (AZMSG2010-003, Mining MSGP).

Based on discussions with RCC, the department understands that construction activities related to the mine and active mining operations have not been initiated, but are anticipated to begin later in 2013.

According to RCC's Notice of Intent for MSGP coverage, the mine site is not located within 2.5 miles of an impaired water or Outstanding Arizona Water. Therefore, RCC was not required to submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) with the NOI (see permit sections 1.1.4.5 and 1.1.4.6).

However, in accordance with the mining MSGP, Appendix B, Paragraph 8 (Duty to Provide Information) the department is requesting RCC submit a copy of the up-to-date site SWPPP 60 days before construction or mining activities are anticipated to begin at the site. In accordance with A.A.C. R18-14-109, the SWPPP submission should include the corresponding department review fee.

If you have any questions concerning this letter or your permit coverage, please contact me at henninger.christopher@azdeq.gov or (602) 771-4508.

Sincerely,

Original signed

Christopher M. Henninger, Supervisor
Stormwater and General Permits Unit

Enclosure: MSGP Authorization Certificate
SWGP13:0013

Southern Regional Office
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